Aspects of the political economy of environmental voluntary agreements - a meta study

Hansen, Lars Gårn

AKF

2005

ASPECTS OF THE POLITICAL ECONOMY OF ENVIRONMENTAL VOLUNTARY AGREEMENTS

A Meta Study

LARS GÅRN HANSEN

AKF
(Institute of Local Government Studies - Denmark)

Abstract
Environmental voluntary agreements with industries are becoming a popular alternative to traditional regulation. One reason may be that such agreements increase implementation cost efficiency. On the other hand, models of the political economy of environmental voluntary agreements point out that efficiency reducing agreements are also possible under certain conditions.
In this paper we interpret empirical evidence from case studies of environmental voluntary agreements using one such policy formulation and implementation model. When our sample is interpreted in this light the data suggests that environmental voluntary agreements may often be chosen in order to shift the responsibility for implementation to industrial organizations that are less sensitive to criticism from powerful environmental interest groups. When this explanation of an environmental voluntary agreement applies, the model predicts that the agreement will be less cost effective and achieve lower environmental performance than the traditional regulatory alternative which would otherwise have been adopted.
Although our findings are not conclusive nor necessarily representative they do suggest the worrying possibility that many of the environmental voluntary agreements being established today achieve lower environmental performance less cost effectively than the most likely traditional regulatory alternative.

1. INTRODUCTION

Evaluation of policy instrument efficiency is traditionally done by comparing different policy instruments for achieving a given set of policy goals with respect to first

T.H.E. Editor(s) (ed.), Book title, 1 - 10.

and foremost static efficiency, but also dynamic and administrative efficiency. Such evaluations essentially assume a dichotomy between the political process of goal setting and that of policy instrument choice. Given this dichotomy the policy instrument evaluation is robust to imperfections in the political process. Achieving given goals in a least cost way is always welfare improving so that for the problem of instrument choice the instrument evaluation retains its relevance even though policy goals may be set imperfectly.

For voluntary agreements with industrial organizations, on the other hand, macro policy goals are subject to negotiations between authorities and the regulated industry and so the assumption of dichotomy must be rejected. When the assumption of dichotomy is rejected, a meaningful comparison of voluntary agreements with traditional approaches must also include an evaluation of the relative 'efficiency' of the underlying political goal setting processes. Policy process efficiency is a new dimension that broadens the usual notion of policy efficiency and should ideally take into account changes in policy process imperfections (e.g. agency capture) as well as transaction costs of the policy formulation process.

In this paper we focus solely on the political economy of voluntary agreements with industrial organizations. The goal of the paper is to confront the policy formulation and implementation model originally presented in Hansen (1999) with empirical evidence collected from a number of case studies of voluntary agreements through a meta study.

In the next section characteristics distinguishing policy formulation through voluntary agreements from the traditional policy formulation process are discussed and in sections 3 to 5 the theoretical model is presented and predictions from the model deduced. This model is a revised version of Hansen (1999) focussing on the particular specification of the model that is relevant for the selection of voluntary agreements studied here. In section 6 the meta study is described and the theoretical predictions confronted with the meta study results. Finally, in section 7 conclusions are drawn.

2. CHARACTERISTICS DISTINGUISHING POLICY FORMULATION THROUGH VOLUNTARY AGREEMENT FROM THE TRADITIONAL POLICY FORMULATION PROCESS

In the following I describe the traditional policy process and the voluntary agreement process based on empirical surveys (e.g. IEA (1995), Glachant (1994)) and point to some key differences.

The traditional process consists of legislation on regulatory instruments where implementation and administration of these instruments are delegated to a regulatory agency. While energy and environmental policy goals may be contested and subject to negotiation, the real battle is over legislation on regulatory instruments. This usually requires a legislative process with direct participation of the executive branch of Government (hereafter just called Government) and the legislative bodies of Government (hereafter called Congress). Affected industrial organizations and other

interest groups may indirectly influence the process through quiet lobbying or by participating in the public debate on policy.

Voluntary agreements (VAs) normally only have Government agencies and individual firms or industrial organizations (IOs) as direct participants. Normally, agreements do not result in legislation. The IOs commit to targets and monitoring procedures, but not necessarily to specific instruments or methods of implementation. Normally, no formal sanctions for non-attention of targets are specified.

One apparent difference between the two policy formulation processes is that Congress participates directly in the traditional process, but is excluded from direct participation in the voluntary process. Instead IOs are elevated to a role as direct participants. Clearly, environmental interest groups (EGs) and Congress may still indirectly influence the voluntary policy process.

When considering voluntary agreements with industrial organizations another novelty is that implementation of environmental goals or agreed-on instruments is left to the industrial organizations rather than to public agencies. This can be seen as a necessary consequence of not involving Congress directly since implementation by traditional regulatory instruments through Government agencies would normally require passing of legislation. Though regulatory agencies may still have a monitoring role, Governments must contract with industrial organizations for implementation. Thus the responsibility for and practical implementation of regulatory instruments are shifted to industrial organizations. The reward to IOs for implementing environmental targets is usually implicit in the agreement. One possibility is that Government promises not to push for traditional regulation if targets are met. Though IOs may be able to implement effective regulatory instruments vis-à-vis member firms, the issue of credibility of Government threats/promises and IO - compliance with the negotiated targets is relevant.

Just as implementation through IOs is a consequence of excluding Congress from direct participation so is the voluntary agreement process what makes implementation through IOs possible. If IOs are to take responsibility for implementation, Government must of course negotiate an agreement with them.

In conclusion voluntary agreements can be seen as a policy process with three central characteristics distinguishing it from the traditional policy process:

(i) Statutory sanctions ensuring IO participation and compliance are not possible under voluntary agreements. Instead IOs must be induced to comply through e.g. threats of new regulation in the area covered by the agreement. The question of what government can credibly threaten to do arises.

(ii) Congress is no longer a direct participant in the policy formulation process - instead IOs become direct participants.

(iii) IOs share responsibility for setting goals, and responsibility for implementation of regulation is shifted to industrial organizations.

It seems that a credible threat (i) supporting a voluntary agreement would be the expected result if the traditional policy process was undertaken. We might then expect that VAs must result in situations where both parties of the agreement (Gov-

ernment and the IO) expect to be at least as well off as under the traditional policy formulation process - otherwise they would not have an incentive to enter into the agreement. Since we cannot expect a VA to achieve more than what the regulator otherwise would have been able to achieve through a traditional regulatory process, one might ask why we see so many VAs.

One explanation might be that shifting implementation responsibility to IOs increases efficiency (i.e. reduces the cost of achieving a given environmental goal) thus giving room for both parties to the agreement to become better off. Let us call this *the efficiency explanation*. However, other explanations may also be possible.

The less direct influence of Congress on the VA-process (ii) may in itself be a reason for entering into an agreement. If Government and opposition parties disagree on policy priorities and the traditional policy process necessitates compromises with opposition parties, it may be that compromising with the IO through a VA can get Government a better deal. Let us call this *the policy disagreement explanation*.

The shift of responsibility for goal setting and goal attainment to IOs (iii) may also be a driving force for undertaking VAs. If governments are sensitive to interest group criticism of policy goals and their possible non-attainment, it may be advantageous to shift responsibility to IOs. Let us call this *the responsibility shifting explanation*.

The first explanation of why VAs are made, also implies that they are welfare increasing. The last two explanations, however, open for the possibility that VAs may be entered into for other reasons than increased efficiency and thus might be welfare reducing. This makes it interesting to develop a theory of the VAs and to confront such a theory with empirical evidence.

3. A SIMPLE MODEL

The model has four active agents: the IO representing polluting firms, the environmental interest group, the Government and the Congress. Government may initiate the traditional policy formulation process through Congress or enter a voluntary agreement process with the IO. We assume that a voluntary agreement blocks initiation of the traditional policy formulation process. When negotiating the agreement Government may try to induce the IO to accept terms that are more favourable to Government by threatening to push for traditional regulation in the event that no agreement made. We assume that Government threats of pushing for regulation, which does not maximise the utility of Government, are not credible. In other words the only credible threat that Government can make for the situation where no agreement is made is to maximize Government utility in connection with the traditional policy process.

Initially we give a fairly detailed presentation of a simple model that captures the shift of direct influence away from Congress and towards the IO caused by the VA process (ii). Then we extend the model by introducing interest group criticism thereby making shifting of responsibility (iii) potentially advantageous.

Both policy formulation processes result in the setting of an environmental goal denoted R (indicating amount by which environmental damage is to be reduced) and

a tax revenue goal *T* (indicating the amount of revenue to be collected through regulatory instruments). Implementation of these goals through the available regulatory instruments (taxes, direct regulation or a combination) results in firm compliance costs denoted *C* in addition to the tax revenue payment.

Let U_f denote the utility effect on firms of regulation and define:

$$U_f = -T - C$$

and assume that the firm IO's utility is equal to the effect of regulation on firms' profits. We assume that the environmental interest groups' utility is equal to regulation effect on environmental damage (i.e. *R*). Government and Congress are both assumed to take into account the utility effects of regulation on firms, the environmental interest group and the part of the public that might benefit from increased tax revenues. However, they may differ in the relative weights attached to these groups in their respective utility function. Let U_c and U_g denote the utility effects of regulation on Congress and Government respectively and define:

$$U_c = U_f + \lambda_c T + \delta_c R$$

$$U_g = U_f + \lambda_g T + \delta_g R$$

where λ_c and λ_g are the utility weights attached to tax revenue by Congress and Government respectively, δ_c and δ_g are the utility weights attached to environmental damage reduction. The utility function can be interpreted as the first order approximation of the actual utility function and includes all key variables affected by regulation.

The negotiation process between Government and Congress under the traditional policy formulation process is not modelled explicitly. Instead the utility function of Congress should be interpreted as representing the result of this process incorporating the relative power of Government and opposition parties in Congress. If Government's utility function parameters are equal to the parameters of Congress' utility function, this implies agreement between Government and opposition parties or a large relative Governmental negotiation power while unequal parameters indicate disagreement and low Government party negotiation power in Congress.

The traditional policy process sets goals that are implemented through traditional Government policy instruments. Let *C(R, T)* describe the resulting firm compliance costs when goals are implemented through the available regulatory instruments.

Thus the traditional policy formulation process is assumed to be described by the following maximization problem:

$$\begin{aligned} &\underset{R,T}{Max} && U_c \\ &Under && C = C(R,T) \end{aligned}$$

the solution to which is denoted R^* and T^*.

Agent utilities with the traditional regulation process become:

$$U_f^* = -T^* - C(R^*, T^*) \tag{1}$$

$$U_c^* = U_f^* + \lambda_c T^* + \delta_c R^* \tag{2}$$

$$U_g^* = U_f^* + \lambda_g T^* + \delta_g R^* \tag{3}$$

In the voluntary agreement process goals $\tilde{R}, \tilde{T}$ are set through negotiations between Government and the IO and then implemented by the IO. Thus the industrial organization representing firms is assumed to have a regulatory instrument vis-à-vis its members (moral suasion, codes of conduct etc) with which it can ensure attainment of the environmental goals. Clearly, public tax revenues are not generated (i.e. $\tilde{T} = 0$). Further it is assumed that the regulatory costs are described by the functions *C (cR, T)* where *T = 0.* Thus by assumptions the two regulatory cost functions are identical, save for the cost parameter *c* and the constraint that *T = 0* under IO implementation. This simplifies the following derivations while capturing the essential difference in relative efficiency through a single parameter c, indicating the relative cost of IO-implementation.

Agent utilities under the voluntary agreement process become:

$$\tilde{U}_f = -C(c\tilde{R}, 0) \tag{4}$$

$$\tilde{U}_c = \tilde{U}_f + \delta_c \tilde{R} \tag{5}$$

$$\tilde{U}_g = \tilde{U}_f + \delta_g \tilde{R} \tag{6}$$

We assume that the IO as well as government can predict the result of the traditional policy process R^*, T^*. Given this, a necessary condition for a voluntary agreement is that both parties to the agreement experience a non-negative utility gain vis-à-vis the traditional policy process which both parties know is the alternative. In other words, a non-empty set of goals ($\tilde{R}$) must exist for which both the following individual rationality (IR) constraints are satisfied:

IR-firm:

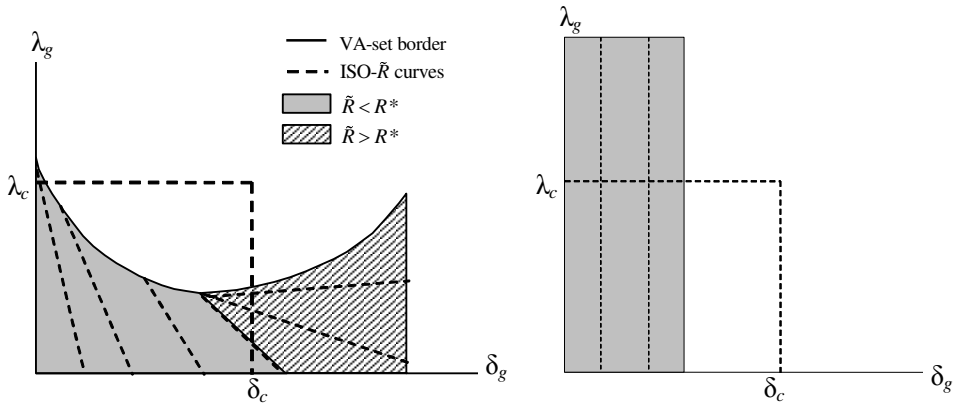
$$\tilde{U}_f = -C(c\tilde{R}, 0) \geq -T^* - C(R^*, T^*) = U_f^* \tag{7}$$

IR-Government:

$$\tilde{U}_g = \tilde{U}_f + \delta_g \tilde{R} \geq U_f^* + \lambda_g T^* + \delta_g R^* = U_g^* \tag{8}$$

The set of parameter combinations in the (δ_g, λ_g) space that for any given combination of parameters (δ_c , λ_c , c) allows a non-empty set of ($\tilde{R}$) satisfying both IR constraints can be found and characterized. When a specific parameter combination (δ_g, λ_g) is a member of this set (hereafter called the VA-set) a voluntary agreement becomes possible. In Hansen (1999) the resulting voluntary agreement for each parameter combination (δ_g, λ_g) is found by assuming that the Nash bargaining solution results whenever a voluntary agreement is possible.

Figure 1 presents a graphical illustration of the VA-set and resulting bargaining solutions (for details of the derivation see Hansen 1999). In figure 1 the VA-set for reduced efficiency (i.e. c>1) is reproduced with its associated interior isoquants indicating the resulting $\tilde{R}$ for the entire VA-set.



a. Revenue raising alternative b. Non-revenue raising alternative

FIGURE 1 Illustration of the VA-set for a model without interest group signalling power

The shaded areas of figure 1a is the VA-set, i.e. the (δ_g, λ_g) parameter points where the VA policy process is chosen. In the dark shaded area VAs will result in lower environmental goals than under traditional regulation and in the light shaded area the resulting VAs will have higher environmental goals. As VA implementation costs rise (c increases) the VA-set is shifted down in the figure and when $c>1$ parameter values ($\delta_g = \delta_c$, $\lambda_g = \lambda_c$) are not included in the set.

The intuition is that when the cost of implementing a given goal is higher under a VA than under traditional regulation (i.e. $c>1$) this extra cost reduces both firm and government utility and must therefore be balanced off by some other benefit if the VA is to be chosen. If government agrees with the policy priorities that result from the traditional policy process, a cost increasing VA will not be chosen because government does not gain anything from avoiding the process of compromising with opposition parties. However, VAs that increase implementation costs may be attractive to governments that disagree with the policy priorities that would result under the traditional policy process. If Government is less concerned with the environment and with raising tax revenue than Congress (i.e. $\delta_g < \delta_c$ and $\lambda_g < \lambda_c$) then VAs that lower environmental goals (and yield no tax revenue) may improve both Government and firm utility. Also if Government is more concerned with the environment than Congress ($\delta_g > \delta_c$) VAs are also possible as long as Government is sufficiently less concerned with raising tax revenue than Congress. In this case Government may be willing to accept the reduction in tax revenue collected from firms that result from a VA if firms agree to a higher environmental goal than would result from the traditional policy process.

Model Predictions

Of specific interest in relation to the following empirical analysis is the situation where the traditional policy alternative is expected to result in non-revenue raising regulation. Then the VA-set becomes a vertical line (figure 1b), i.e. becomes independent of the λ since $T^* = 0$. When VAs reduce efficiency (the situation illustrated in figure 1b) Governments that are more concerned with the environment will no longer be able to induce firms to attain higher environmental goals than under the traditional process because there is no credible threat of tax payment. Thus if *the policy disagreement explanation* applies (and many VAs are inefficient) *only Governments that are less concerned with the environment than Congress will find VAs advantageous* since VAs will achieve lower environmental goals than the traditional alternative. If on the other hand VAs generally improve efficiency (corresponding to the VA-set border moving to the right in figure 1b) it becomes possible for VAs to increase environmental performance relative to traditional regulation (because of the efficiency gain) and we would expect Governments that are less as well as more concerned with the environment than Congress to find VAs advantageous.

Irrespective of the VA's relative efficiency, the model implies that environmental performance increases relative to traditional regulation as Government's concern with the environment increases relative to Congress (corresponding to a move to a point in the figure with a higher δ-value and so to a higher $\tilde{R}$-isoquant).

4. EXTENDING THE MODEL WITH FIRM IO SIGNALLING POWER

This augmentation of the model attempts to capture the *responsibility shifting explanation* suggested in the introduction. Presumably interest groups have the ability to do quiet lobbying under the traditional process as well as under the VA process. However, interest groups often participate in the public debate as well in order to sway public opinion in their favour thus putting indirect pressure on policy makers. The shift in responsibility that VAs cause may be important with respect to this part of the interest group's activity. It will probably reduce the effectiveness of an interest group's public criticism of Government, if Government is not perceived as responsible for the criticized act or if the interest group is perceived as sharing responsibility for the criticized act.

We will present the augmented model formally, but only give an intuitive explanation of the model results (the reader interested in the formal model derivation is referred to Hansen 1999).

In the augmented model it is assumed that interest groups may affect public opinion by signalling the utility affect that policy has on their constituents. If the signal is credible the public may punish/reward those perceived as responsible (e.g. through the ballot box or through consumer demand decisions). If the interest group is powerful (i.e. the public reacts to the signal that is sent by the interest group) this will affect the result of the traditional policy process by making it less attractive for Congress and Government to reduce the powerful interest group's utility.

Now consider the utility functions when the firm IO has signalling power under the traditional policy process. The IO is able to signal the utility effect of policy on firms to the public who in turn may punish Government and Congress that are responsible for policy, e.g. at the next election. The risk of punishment is assumed to be proportional to the utility effect signalled by the IO. Augmenting the previous model in this way we have the following agent utilities under the traditional policy process:

$$U_c^* = U_f^* + \lambda_c T^* + \delta_c R^* + s^f U_f^* \tag{9}$$

$$U_g^* = U_f^* + \lambda_g T^* + \delta_g R^* + s^f U_f^* \tag{10}$$

$$U_f^* = -T^* - C(R^*, T^*) \tag{11}$$

where s^f is the marginal utility effects of firm interest group criticism.

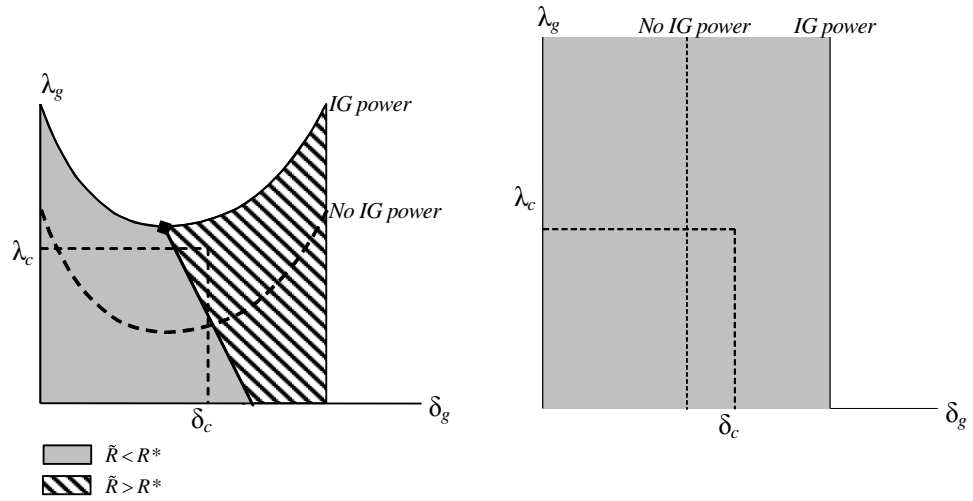
When responsibility for setting the environmental goal is shared with the IO through a voluntary agreement, it is no longer possible for the IO to credibly criticize policy and so agent utilities under the voluntary agreement process are as in the previous subsection:

$$\tilde{U}_f = -C(c\tilde{R}, 0) \tag{12}$$

$$\tilde{U}_c = \tilde{U}_f + \delta_c \tilde{R} \tag{13}$$

$$\tilde{U}_g = \tilde{U}_f + \delta_g \tilde{R} \tag{14}$$

In the model the effect of interest group signalling on Government and Congress utility is assumed to be the same so that only the policy priority weights can differ between the two utility functions. This means that the effect of signalling on the VA-set can be illustrated in the same type of diagram as in figure 1. The result of firm signalling power is that the VA-set moves up in the graph as shown in figure 2.



a. Revenue raising alternative b. Non-revenue raising alternative

FIGURE 2 Illustration of the VA-set for a model with interest group signalling power

The intuition is that when the firm IO has signalling power, it will criticize policy under the traditional process thus reducing Government utility. When responsibility for setting the environmental goal is shared with the IO through a voluntary agreement, it is no longer possible for the IO to credibly criticize policy. This gives an extra benefit to Government of entering into a VA vis-à-vis the situation without firm IO signalling power so that for all parameter sets the VA becomes more attractive (the outward shift of the border in figure 2a). At the same time firm bargaining power increases so that the resulting VA will have lower environmental performance than if the firm did not have signalling power (we see that isoquants and thus the area of reduced environmental performance also shift out in figure 2a). If the benefit of eliminating firm IO criticism is large enough it will make VAs that increase implementation costs attractive to Government even though there is no disagreement with Congress policy priorities. The utility benefit of eliminating firm IO criticism may be greater than the utility loss from increased implementation costs.

Model Predictions

When the traditional policy alternative is expected to result in non-revenue raising regulation (figure 1b) firm signalling power will also result in an outward shift of the vertical VA-set border and the underlying $\tilde{R}$-isoquants. Thus as in the previous section the model implies that efficiency reducing VAs will lower environmental performance relative to traditional non-revenue alternatives (because Government does not have a credible threat of tax payment as an inducement). However, even

though environmental performance af the VA falls further as IO signalling power increases (because of increasing IO bargaining power) it may become advantageous even for Governments that are *more* concerned with the environment than Congress to choose the VA process. Governments that are more concerned with the environment may be willing to accept a lower environmental target than under traditional regulation in order to avoid harmful IO criticism.

Irrespective of the VA's relative efficiency and IO signalling power, the model still implies that environmental performance increases relative to traditional regulation as Government's concern with the environment increases relative to Congress (corresponding to a move to a point in the figure with a higher δ-value and so to a higher $\tilde{R}$-isoquant).

5. EXTENDING THE SIMPLE MODEL WITH ENVIRONMENTAL INTEREST GROUP SIGNALLING POWER

Now consider environmental interest group signalling power, but in a model allowing responsibility for goal setting to be decoupled from responsibility for policy implementation. Let R_g denote the goal set at the time of policy implementation and R the damage reduction actually attained. The environmental interest group can criticize goal setting as well as goal attainment and we assume that non-attainment of a set goal in itself increases the risk of punishment. The following simple specification catches this. At the time of goal setting the utility effect of criticism is:

$$s(R_g - \overline{R})$$

where $\overline{R}$ is the level of emission perceived by the public as acceptable. At the time of goal attainment the utility effect of criticism is:

$$2s(R - R_g)$$

so that non-attainment of a set goal is costly, while the net effect of criticism of goal setting and goal attainment when goals are reached is that the actually attained emission reduction is criticized (the net effect is $s(R - \overline{R})$).

Agent utilities under the traditional policy process become:

$$U_f^* = -T^* - C(R^*, T^*) \tag{15}$$

$$U_c^* = U_f^* + \lambda_c T^* + \delta_c R^* + s^e(R^* - \overline{R}) \tag{16}$$

$$U_g^* = U_f^* + \lambda_g T^* + \delta_g R^* + s^e(R^* - \overline{R}) \tag{17}$$

where s^e is the marginal utility effects of environmental interest group criticism on Congress and Government. Under the traditional process set goals are attained in order to avoid the extra criticism of goal non-attainment.
Under the voluntary agreement process the Congress has no responsibility. Government shares responsibility for goal formulation with the firm, while implementation is the sole responsibility of the firm. We then have

$$\tilde{U}_f = - C(c\overline{R}, 0) + s_f^e(\tilde{R} - \overline{R}) + 2\, s_f^e(\tilde{R} - \tilde{R}_g) \tag{18}$$

$$\tilde{U}_c = \tilde{U}_f + \delta_c \tilde{R} \tag{19}$$

$$\tilde{U}_g = \tilde{U}_f + \delta_g \tilde{R} + s^e(\tilde{R}_g - \overline{R}) \tag{20}$$

where s_f^e is the marginal utility effects of environmental interest group criticism on the firm.

Although the intuition is somewhat different, the result of environmental interest group signalling power is that if $s_f^e < s^e$ the VA-set moves up in the graph just as shown in figure 2a.

The intuition is that when the environmental interest group has signalling power, it will criticize policy (goal setting and goal attainment) under the traditional process thus reducing Government utility in proportion to the actual emission reduction achieved. When responsibility for attaining the goal is shifted to the firm IO through a voluntary agreement, Government is no longer susceptible to criticism of goal attainment. If Government can persuade the firm IO to set high goals then the VA entails an extra utility benefit for Government even though the higher goals are not met since Government is not responsible for goal attainment. However, the firm IO must be willing to accept responsibility and the utility loss associated with environmental interest group criticism of non-attainment of the set goal. Thus only if firms are less sensitive to environmental interest group criticism than Government ($s_f^e < s^e$) will there be potential gains from trading responsibility for reduced tax payment and reduced realised emission reductions. If $s_f^e < s^e$ this gives an extra benefit of entering into a VA which, like in the case of firm IO signalling, makes VAs more attractive to Government. If the benefits of trading responsibility are large enough it will make VAs that increase implementation costs attractive to Gov-

ernment even though there is no disagreement with Congress policy priorities. Actual emission reductions may be lower or higher than under traditional regulation, but in all cases goals are set higher than attained emission reductions (i.e. we will always have $\tilde{R}_g > \tilde{R}$). It is important to stress that this non-attainment of the set goal is an implicit part of the agreement with Government.

Model Predictions

When non-revenue raising traditional policy alternatives expected the situation can parallel to above be illustrated by figure 2b. EG-signalling power will just as IO-signalling power cause an outward shift of the vertical VA-set border and the underlying $\tilde{R}$-isoquants. Efficiency reducing VAs will also in this case lower environmental performance relative to traditional non-revenue alternatives (because of Government's lack of a credible tax alternative). In this case, however, environmental performance af the VA falls as EG-signalling power increases because this increases the IO's bargaining power (i.e. it increases the value of the asset supplied by the IO: taking responsibility). Despite this it may become advantageous for environment biassed Governments to choose the VAs and accept lower environmental performance in order to reduce the effect of harmful EG-criticism by shifting responsibility to the IO.

Essentially then the model predicts that EG-signalling power has the same effect on the propensity to enter VAs and on the resulting environmental performance as IO-signalling power and that this effect is stronger the less susceptible firms are to public criticism from the EG. The key difference is the mechanism of responsibility transfer which in this case is through (planned) non-attainment of the environmental goals set in the agreement. Thus the model would predict increasing non-attainment of goals as EG-signalling strength increases (while this would not be expected if the agreement were driven by IO signalling strength).

Finally, we again note that irrespective of the VA's relative efficiency and EG-signalling power, the model implies that environmental performance increases relative to traditional regulation as Government's concern with the environment increases relative to Congress (corresponding to a move to a point in the figure with a higher δ-value and so to a higher $\tilde{R}$-isoquant).

6. THE META STUDY

The idea behind conducting a meta study was to utilize the knowledge gathered by researchers through case studies on about specific voluntary agreements. Our hope was to generate a sufficient number of observations of combinations of key model variables from studied VAs to allow testing of model predictions.

The meta study (see Chidiak et al. (1999) for details) was conducted by telephone interviewing researchers who have published case studies of voluntary agreements with industrial organizations. A questionnaire with multiple choice questions was used as an interview guide. Choices among the listed answers were elicit-

ed and explanatory comments noted by the interviewers. Researchers and case studies were located through the so-called snowball method (starting with case studies we were aware of, each researcher was asked if he/she had knowledge of other VA case studies).

The questionnaires covered most key variables of the model presented in the previous section (in addition to questions on information and cost structure and on implementation of the VA). In order to avoid arbitrary reference standards where possible, questions elicited rankings rather than ordinal evaluations. The questionnaire is reproduced in Chidiak et al. (1999), while the analysed VAs along with a list of interviewed researchers and referenced case studies are listed in appendix 1.

All in all 20 interviews were completed of which 19 turned out to be on VAs with industrial organizations. The number of answers to specific questions was in many cases reduced further since researchers were often unable to give qualified answers to all questions.

In the next subsection we present descriptive statistics for variables generated from answers to those questions that are relevant for testing model predictions (tables indicate the source question from which the variable is derived and where this is not apparent how the variable is derived). In the following subsection we formulate and attempt to test model predictions in terms of correlation patterns between these variables.

6.1 Descriptive Statistics

Initially we elicited the researcher's evaluation of the type of traditional regulation that would have been implemented without the VA and the credibility of this threat. In table 1 the background threat for the VA is summarised for the 19 relevant cases.

TABLE 1. Strength and type of alternative policy if VA had failed

Regulatory threat	*Number of cases*
Tax:	1
Direct regulation:	9
Clear that traditional regulation would have been implemented, but unclear which type:	3
Unclear whether traditional regulation would have been implemented :	3
No response:	3

It is notable that in most cases there was a clear threat of traditional regulation if the VA failed which suggests that the VAs probably have affected firm behaviour. It is also notable that the regulatory threat in most cases is direct regulation, i.e. non-revenue raising regulation. Thus our data should be interpreted using the model with a non-revenue raising traditional policy threat.

Then we asked the researcher for his opinion of Government's environmental and firm bias relative to opposition parties. In table 2 Government bias variables are summarised.

TABLE 2. Government bias relative to opposition parties

	Biassed against	*No bias*	*Biassed in favour of*	*No response*
Gov. bias vis-à-vis firms (MGFB):	5	6	5	3
Gov. bias vis-à-vis environment (MGEB):	5	11	2	1

These questions try to get at the model bias parameters (δ_g, λ_g) and (δ_c , λ_c). There seems not to be any dominating bias pattern for the sampled VAs. However, it is notable that the variables are highly (negatively) correlated, i.e. governments that are biassed in favour of firms also tend to be biassed against the environment.

We also elicited the researcher's opinion of interest group signalling strength and firms' concern with their environmental image. In table 3 these variables are summarised.

TABLE 3. Interest group signalling power

	Below average	*Average*	*Above average*	*No response*
IO signalling power (MIOS):	2	5	12	0
EG signalling power (MEGS):	5	3	11	0
Firms' concern with environmental image (FIMI):	3	4	9	3

There seems to be a tendency for EGs and IOs in the sample to have above average signalling strength and for the sampled VA firms to be more concerned with their environmental image than other firms.

In table 4 the researchers' opinion of whether EG and opposition parties approve of the use of a VA is summarised.

TABLE 4. Approval of the VA instrument

	Disapprove	*Non-committed*	*Approve*	*No response*
EG approval of the use of the VA instrument (EGVA):	9	8		2
Opposition approval of the use of the VA instrument (OPVANY):	3	7	6	3

We note that while EGs are critical of the use of VAs in a majority of cases opposition parties are only critical in one out of five cases.

Finally, the interviewed researchers found that EGs generally are more critical of the use of VAs as the way to reach environmental goals than they were of the actual goals set in the studied VAs. We interpret this difference as a lack of confidence in the VA's ability to actually reach the goals set in the agreement. In table 5 we tabulate the variable 'EG goal confidence' constructed in the following way: If the EG has a better valuation of the VA goal than of the VA instrument the EG is placed in the 'Not Confident' category. If the EG has a lower evaluation of the goal than of the VA instrument than the EG is placed in the 'Confident' category. If the EG has the same evaluation of the goal as of the VA instrument then the EG is placed in the 'Non-committed' category.

TABLE 5. EG goal confidence

	Not Confident	*Non-committed*	*Confident*	*No response*
EG goal confidence (DVAGO):	4	12	1	2

Table 5 indicates a tendency for EGs not to be confident in the VA's ability to reach the goals set in the agreement.

6.2 Test of Model Predictions

We see from table 1 that the traditional policy threat was non-revenue raising regulation in almost all cases covered by the meta-study. In table 6 we summarize the empirical findings that the theoretical model predicts for the situation with non-revenue raising regulatory threats. In the first four rows the predicted findings (derived in sections 3, 4 and 5 in terms of questionnaire variable correlation patterns etc.) are summarised for each of the different VA-explanations allowed for by the model, i.e.:

- the efficiency explanation
- the disagreement explanation

- the responsibility shifting explanation driven by IO signalling power and
- the responsibility shifting explanation driven by EG signalling power

In the last row we present the actual correlation patterns etc. found in the data.

Columns 1 and 2: The key prediction for the disagreement explanation (i.e. that VAs are inefficient and driven by disagreement over policy priorities between Government and Congress) presented in section 3 was that we would only expect firm biassed governments to enter VAs and that we would expect Congress to be opposed to the use of VAs. This pattern is not expected if any of the other three explanations apply. We do not find this pattern in our data.

Column 3: If VAs are explained by IO signalling power (i.e. that VAs are inefficient and driven by Government's desire to avoid being publicly criticized by powerful IOs) we would expect EG approval of the use of VAs (variable EGVA) to be negatively correlated with firm IO signalling power (variable MIOS). The reason being (as shown in section 4) that environmental performance falls as IO signalling strength increases. If VAs are not explained by firm signalling we would on the other hand not expect EG approval to be correlated with IO signalling power. There is no such correlation pattern in our data, rather there is a small highly insignificant positive correlation coefficient.

Column 4: If on the other hand VAs are explained by EG signalling power (i.e. that VAs are inefficient and driven by the Government's desire to avoid being publicly criticized by powerful EGs) we would expect EG approval of VAs (variable EGVA) to be negatively correlated with EG signalling power (variable MEGS) instead. In this case (as shown in section 5) environmental performance falls as EG signalling power (and thereby IO bargaining strength) increases. We do in fact find a highly significant negative correlation coefficient in our data.

Column 5 and 6: Further, if VAs are explained by EG signalling power 'planned' non-attainment of environmental goals increases with EG signalling power but falls with the firms' concern with their environmental image. With this explanation we would therefore also expect EG goal confidence (variable DVAGO) to be negatively correlated with EG signalling power (variable MEGS) and positively correlated with the firms' concern with their environmental image (variable FIMI). Though the coefficients are not significant at the 5% level we also find this pattern in our data.

Column 5 and 6: Finally, for all four explanations generated by the model (including the efficiency explanation) we expect EG approval of VAs (variable EGVA) to be positively correlated with government environmental bias (variable MGEB) as well as with the firms' concern with their environmental image (variable FIMI) since this in all cases increases environmental performance. We find a significant positive correlation coefficient for EGVA*MGEB in our data while the corresponding coefficient for EGVA*FIMI is highly insignificant.

TABLE 6. Model predictions and meta study results

	Dominating Government bias pattern	*Dominating Government-Congress agreement pattern on use of Vas*	*EGVA-MIOS correlation*	*EGVA-MEGS correlation*	*DVAGO-MEGS correlation*	*DVAGO-FIMI correlation*	*EGVA-MGEB correlation*	*EGVA-FIMI correlation*
Model predictions with:								
Efficiency explanation:	none	None	none	none	none	none	positive	positive
Disagreement explanation:	biassed in favour of firms	Government-Congress disagreement	none	none	none	none	positive	positive
Responsibility shifting explanation (driven by IO signalling power):	none	none	negative	none	none	none	positive	positive
Responsibility shifting explanation (driven by EG signalling power):	none	none	none	negative	negative	positive	positive	positive
Meta study:								
Findings:	none	none	none	negative**	(negative)	(positive)	positive*	none
Spearman's rho:			0.170	-0.862**	-0.368	+0.309	+0.603*	+0.097
(significance level)			(0.513)	(0.000)	(0.146)	(0.283)	(0.013)	(0.741)

* significant at 5% level.

** significant at 1% level.

In conclusion no correlations of unexpected signs were found and of the two correlations that were predicted by the model regardless of VA explanation one was found. Given the small number of cases not finding all the predicted correlations is not surprising. On the other hand, it is also clear that applicability of the model has not been tested vigorously.

Taking the model for granted we do not find the variable patterns that would be generated if *the policy disagreement explanation* or *the IO signalling explanation* dominated in the studied cases. Given the small number of cases studied this should not in itself be be over interpreted. However the pattern expected if *the EG signalling explanation* applied is seen in the meta study data though it is not significant for all variables. Finding such a pattern even though the number of cases is small is an indication that *the EG signalling explanation* may apply in many of the cases studied.

Thus, if we take the model for granted our data suggests that EG signalling may explain the use of VAs in many sample cases. The model predicts that VAs in these cases are less efficient than the traditional alternative regulation that would have been adopted without the VA. Further, the model predicts that VAs in these cases achieve a lower environmental performance than the traditional alternative would have achieved which may reduce social welfare further.

When interpreting this study it should, however, be stressed that we can not expect the studied sample of VAs to be representative af all VAs (in fact the way researchers select VAs to be studied is probably far from generating a random selection as is the way we have located the subset of case studies included in the meta study).

7. CONCLUSIONS

The study reveals that in most of the analysed cases VAs were backed by a clear threat of regulatory action if the VA failed. Thus we expect that most of the VAs covered in the study have been able to induce changes in firm behaviour. The focus of the study has been whether the VA is more or less cost effective than the traditional regulatory alternative.

We have presented a theoretical model offering several explanations of VAs and confronted it with empirical evidence from case studies of voluntary agreements.

The empirical evidence does not falsify the model, however, the study only covers a small number of cases and testing is only attempted in a few dimensions. Thus even though the results are mildly encouraging with regard to the model's explanatory power, the theoretical model is by no means tested vigorously. Further generalisation beyond the specific sample of VA's studied is not possible because of representativity problems.

If the theoretical model is taken for granted, the data tends to support the hypotheses that Governments in many of the sample cases choose VAs in order to shift the responsibility for implementation to industrial organizations that are less sensitive to criticism from powerful environmental interest groups. When this explanation of a VA applies, the model predicts that the VA will be less cost effective and achieve

lower environmental performance than the traditional regulatory alternative which would otherwise have been adopted.

Although the presented findings are not conclusive, nor necessarily representative, they do suggest the worrying possibility that some - possibly many - of the VAs being established today achieve lower environmental performance less cost effectively than the most likely traditional regulatory alternative.

ACKNOWLEDGEMENTS

The research leading to this chapter is a product of the VAIE-project and has been funded by The European Commission, DG XII for science, research and development through the JOULE programme.

REFERENCES

Chidiak, M., M. Glachant and L.G.Hansen, 1999, 'VAIE project task A final report - Theoretical Perspectives on the Efficiency of Voluntary Approaches to Promote Energy Efficiency', CERNA, Paris.

Glachant, M., 1994, The setting of Voluntary Agreements Between Industry and Government: Bargaining and Efficiency, Business Strategy and The Environment 3 (2), 43-49.

Hansen, L.G. (1999): 'Environmental Regulation through Voluntary Agreements' in Voluntary Approaches in Environmental Policy eds: C. Carraro and F. Leveque, Kluwer academic publishers, Dordrecht.

IEA, 1995, Survey on Voluntary Agreements: Status, Interim Report and Next Steps, IEA note.

APPENDIX

VAs COVERED IN THE META STUDY SAMPLE

The meta study was conducted by telephone interviewing researchers who have published case studies of negotiated voluntary agreements. A questionnaire with multiple choice questions was used as an interview guide. Choices among the listed answers were elicited and explanatory comments noted by the interviewers. Researchers and case studies were located through the so-called snowball method (each researcher was asked if he/she had knowledge of other VA case studies). 20 interviews were completed of which 19 were negotiated VAs. Coverage of the studied cases is illustrated in Table 1, while the VAs in the sample are listed in Table 2. Finally, the full list of researchers and the case study references are listed at the end of the appendix.

TABLE 1. Countries and environmental areas covered by the VAs of the study

	Air	*Water*	*Waste*	*All*
Finland	1			
Norway	1			
Denmark	2			
Holland	2		2	2
Belgium	1		1	
Germany		1	2	
France		1	2	
Italy	1			

TABLE 2. VAs in the meta study sample

Belgian VA for SO_2 and NO_x emissions from Electricity Suppliers (1991)
Belgian Convention with the Cement Industry for waste treatment (1995)
Finnish Agreement on energy conservation with the paper sector
Danish VA with the plastics industry over PVC use
Danish VA with the electric utilities over SO_2/NO_x (1996)
Dutch Packaging Covenant (1997 version)
Dutch Covenant with the Chemical Industry (all environmental concerns)
Dutch VA with spray can producers (on CFC use in spray cans)
Dutch packaging covenant (1991 version)
Dutch VA with the Basic Metal Industry (on all environmental issues)
Dutch LTA (on energy efficiency) with the Chemical Industry
French VA on Packaging waste recycling: ECO-EMBALLAGES (1992)
French VA on soaps and detergents (over phosphates) (1986-89-90)
French VA on end-of-life vehicle recycling/reuse (1993)
German VA on Packaging waste recycling: DSD (1991)
German VA on end-of-life vehicles (recycling) (1996)
German VA on EDTA (Chemical gelatine agent) (1991)
Italian VAs on the quality of fuels (1989-92)
Norwegian VA on GHG emissions with the aluminium industry

(The interviewed researchers were:1) Franck Aggeri, CGS, Ecole des Mines de Paris, Paris, France, 2) Steven Baeke, University of Ghent, Belgium,3) Peter Börkey, CERNA, Ecole des Mines de Paris, Paris, France, 4) Karl Brockmann, Centre for European Economic Research, Mannheim, Germany, 5) Jacco Farla, University of Utrecht, The Netherlands, 6) Matthieu Glachant, CERNA, Ecole des Mines de Paris, Paris, France, 7) Verina Ingram, University of Wageningen and IWACO, The Netherlands, 8) Katja Johannsen, AKF, Denmark, 9) Ralph Jülich, Öko Institute, Darmstadt, Germany, 10) Signe Krarup, AKF, Denmark, 11) Delphine Misonne, CEDRE, Bruxelles – Belgium, 12) Giulia Pesaro, IEFE, U. Bocconi, Milan, Italy, 13) Philippe Quirion, CERNA, Ecole des Mines de Paris, Paris, France, 14) Mikael Togeby, AKF, Denmark, 15) Asbjørn Torvanger, Center for International Climate and Environmental Research, Oslo, Norway)

CASE STUDY REFERENCES

Aggeri, F. & A. Hatchuel (1995): A Dynamic Model of Environmental Policies. The case of innovation oriented voluntary agreements, Nota di Lavoro 24.97, FEEM, February 1997.

Börkey, P. & M. Glachant (1997): Les engagements volontaires de l'industrie dans le domaine de l'environnement: nature et diversité, final report to the Ministry for the Environment Ademe (French Environment Agency), CERNA.

Croci E. & G. Pesaro (1997): Voluntary agreements in Italy: a new approach in environmental policy. In: ENER Bullettin, n. 20.97.

Croci E. & G. Pesaro (1997a): Gli accordi volontari in campo ambientale: evoluzione del quadro di riferimento. In: Economia delle Fonti di Energia e dell, Ambiente, n.3/97 [Environmental voluntary agreements: evolution of the reference framework].

Environmental Sociology and Social Methodology Group, Wageningen University (1998): Joint Environmental policy-making, Final Report, Wageningen, 1998.

Gebers, G. Biekart J-W.; Bizer, K.; Ingram, V. Jülich R., (1998): New Instruments for Sustainability – The Role of Environmental Agreements, Final Report and Annex Case Studies, Darmstadt.

Glachant, M. & T. Whiston (1997): Voluntary Agreements between Industry and Government – the case of Recycling Regulations. In: Environmental Policy in Europe: Industry, Competition and the Policy Process, edited by F. Lévêque, Edward Elgar, Cheltenham, UK.

Glachant, M. (1995): »DSD contre Eco-Emballages: Analyse comparée de l'efficacité des consortia de recyclage allemands, français et italiens«, study for ADEME, CERNA.

Ingram, V. (1998): The Long Term Energy Efficiency Agreement with the Fine Ceramic Industry, (The Netherlands), in Öko Institut (1998) – Annex Case Studies, Darmstadt.

Ingram, V. (1998): The SUBAT Agreement (The Netherlands), in Öko Institut (1998) – Annex Case Studies, Darmstadt.

Jülich, R. (1998): The EDTA Agreement (Germany), in Öko-Institut (1998) – Annex Case Studies, Darmstadt.

Jülich, R. (1998): The Battery Agreement (Germany), in Öko-Institut (1998) – Annex Case Studies, Darmstadt.

Krarup, S., M. Togeby and K. Johannsen (1997): De første aftaler om energieffektivisering – Erfaringer fra 30 aftaler indgået i 1996, AKF. Working paper.

Misonne, D. (1998): The Agreement between the Walloon Region and the Cement Industry (Belgium), in Öko-Institut (1998) – Annex Case Studies, Darmstadt.

Misonne, D. (1998): The River Contract of the Upper-Meuse (Belgium), in Öko-Institut (1998) – Annex Case Studies, Darmstadt.

Öko Institut (1998): New Instruments for Sustainability, edited by B. Gebers, Final Report, Darmstadt 1998.

Quirion, P. (1994): ”La gestion des déchets d'emballages ménagers en France et en Allemagne: élements d'evaluation économique », DEA thesis, Université de Paris 1 Pathéon-Sorbonne.

Rennings, K., K.L. Brockmann & H. Bergmann (1997): »Voluntary Agreements in Environmental Protection – Experiences in Germany and Future Perspectives«, published as ZEW Discussion paper.

Rietbergen M., Farla J., Blok K. (1998): Quantitative Evaluation of Voluntary Agreements on Energy Efficiency, paper for the CAVA workshop in Ghent on November 26-27, 1998, 15 p.

Seyad, A., S. Baeke & M. De Clercq (1998): ”Success determining factors for negotiated agreements: A Comparative Case Study of the Belgian Electricity Supply Industry and the Packaging Sector”, to be published in ”Co-operative Environmental Governance – Public-Private Agreements as a Policy Strategy”, edited by P. Glasbergen, Utrecht University.